

with sparse innate coronary collateral vessels similar to those in humans, certain interventions can promote coronary collateral artery development and potentially protect ischemic myocardium by salvaging tissue in the jeopardized zone and reducing infarct size.

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The Flow Cytometer in the Clinical Laboratory

FLOW CYTOMETRY involves passing a beam of laser light through a stream of cells and then analyzing the scattered light in relation to the number of cells stained by one or more fluorescent probes. This technique has been used for at least ten years in research laboratories to separate out specific cell populations and to analyze cells and cell populations with respect to surface antibody staining or DNA staining or both.

There are significant advantages to the use of the flow cytometer. Fluorescence microscopy seldom allows for the quantitative measurement of the staining properties of each individual cell, and becomes a very laborious process if more than a few hundred cells are to be analyzed. In addition, bulk measurements of collections of cells give average results for the overall population and do not really delineate possible subpopulations that often exist in lymphomas, for example. Flow cytometry, on the other hand, allows for the rapid and quantitative measurement of thousands of cells and multiple properties of each. For example, DNA content and cell size can be used as criteria for the detection of abnormal populations of malignant cells. It has been shown that hyperdiploid cells can easily be distinguished from their normal counterparts by determining both the size and the DNA content of the cells. Braylan and colleagues have recently used the simultaneous measurement of DNA content and surface markers to define abnormal cell populations in malignant lymphomas. Because malignant cells are capable of changing during the course of a disease, it is important not to rely solely on one method of identification.

The clinical applications of the flow cytometer are generally restricted at present to the analyses of lymphoma and leukemia lymphocytes. Future application may involve a determination of κ - to λ -chain ratios. The amount of each chain on the surface of normal lymphocytes is about equal, whereas in malignant cells, a change in the ratio of κ - to λ -chains is observed. Other applications will involve the detection of autoantibodies in autoimmune hemolytic anemia, neutropenia and immune thrombocytopenia. Of these potential uses, the

most developed at present is the detection of antibodies on platelets. Antiplatelet antibodies can be accurately measured in 1 ml of blood from a patient with a platelet count of 1,000 per μ l or less. This determination cannot be done by any of the other techniques currently used because of the significantly larger numbers of platelets required.

The primary drawback of this system is the cost. Most flow cytometers currently used for clinical applications cost in excess of \$100,000. For use in only a limited number of tests, most hospitals other than large centers for leukemia or lymphoma would have trouble justifying such a large capital expenditure. A problem specifically associated with such sophisticated equipment is that, in spite of attempts to simplify the mode of operation, a highly trained technician is needed to operate the machine because the likelihood of major breakdowns is quite high. In addition, the rate of cells passing through the machine cannot really be increased above 5,000 cells per second and this is relatively slow if one has to analyze a million cells to get reliable data. This is a serious drawback, and unless there is a basic change in technology, it will remain a major limiting factor.

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Current Trends in Drug Overdose

DRUG AVAILABILITY, price and current fads are mainly responsible for changing trends in drug intoxication. In Los Angeles, phencyclidine hydrochloride (PCP) is widely available, relatively cheap and the most popular drug of abuse. The incidence of admissions to hospital for PCP intoxication is correspondingly high. Four PCP analogues with effects similar to PCP are available on the streets.

Cocaine use is rampant, and cases of severe cocaine poisoning are appearing sporadically. Some patients who die in status epilepticus have a ruptured package of cocaine in the bowel at autopsy.

Heroin, a perennial favorite, is presently abundant and down in price. Intravenous injection of heroin mixed with cocaine (a "speed ball") is an old combination regaining its popularity. A new fad is "smoking" heroin by heating it on a piece of aluminum foil and inhaling the vapors. As the drug volatilizes the particles "jump around" on the foil. This practice is called "chasing the dragon." The most popular narcotic appears to be codeine, usually taken in tablets containing either aspirin or acetaminophen. Acetaminophen intoxication remains a common problem.

Two drugs of the 1960s, glutethimide and LSD (lysergic acid diethylamide), have returned. Glutethi-

mide is frequently ingested with acetaminophen and codeine. This combination, called a "Doriden load," is favored by persons with narcotic addiction as a substitute for heroin. Glutethimide overdoses are often life-threatening. LSD is impregnated on postage-stamp-size colored pictures printed sequentially on transparent plastic ("transfers") or white porous paper ("blotters"). Drug abusers lick these "papers," transfer the picture to their skin and experience LSD intoxication. LSD is also poured over small pieces of pasta for street sale.

The preferred hallucinogen for "new wave rockers" is MDA (methylenedioxymphetamine), which may be sold as very small—about 4 by 6 mm—flat, rectangular transparent chips of crystallized material called "window panes."

The use of amphetamines, including "look-a-likes" containing caffeine or phenylpropanolamine, is increasing, especially that of crystalline methamphetamine called "crank."

Intoxication from various sleeping pills and benzodiazepines continues. The leading cause of intoxication is still ethanol alone or in combination with another drug.

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Fine-Needle Aspiration Biopsy of the Prostate Gland

FINE-NEEDLE ASPIRATION has been used as a diagnostic tool since the beginning of this century. A mildly invasive technique, it has grown in popularity in the United States primarily on the basis of the ease and accuracy with which it can be used to obtain biopsy specimens to diagnose lesions in breast, superficial lymph nodes and thyroid. The prostate, however, is not so readily accessible and fine-needle aspiration of masses in this organ has not gained so ready an acceptance. After ten years' experience of doing this procedure on superficial lesions at the Karolinska Hospital in Stockholm, Dr Sixten Franzen in 1960 constructed a needle guide that makes the prostate easy to reach through the rectum using a 22-gauge needle.

The use of fine-needle aspiration is indicated when there is a suspicious, palpable lesion in a prostate. If a patient presents with distant metastasis for which the prostate may have been the source of the primary lesion, random aspirations of the four quadrants of the gland can be done. Not infrequently, such quadrant biopsy specimens will confirm the diagnosis of prostatic carcinoma. Lesions of clinically apparent prostatitis should not be aspirated.

With the Franzen needle guide, specimens can be taken of even very small (about 0.5 cm) and superficial lesions with a high degree of accuracy. Specimens from several different areas of the prostate can be taken without significant hemorrhage or other side effects.

Fine-needle aspiration of the prostate is an outpatient procedure and does not require anesthesia. Patient discomfort is minimal, and patients readily accept a repeat biopsy if it is required.

In contrast, a core biopsy specimen obtained with a cutting needle requires local or general anesthesia and is less accurate, especially for small and superficial lesions in the posterior portion of the prostate. The sections from a core biopsy show only a fraction of the cells present in the specimen. An aspirate specimen almost always shows more cells for study than does that from core biopsy. In general, cellular detail on cytologic preparations from fine-needle aspiration is superior to the paraffin-embedded sections of a core biopsy.

The main disadvantage of this procedure is that there is a shortage of physicians in this country experienced in the biopsy technique and in the interpretation of the resultant smears. Good results cannot be obtained through reading about the technique and then attempting to do it; fine-needle aspiration must be learned under supervision, and the smears should be examined to ensure adequacy of the material.

After acquiring sufficient skill in the technique, it is still necessary to do at least five to ten aspirations a week. This is about the same degree of experience necessary to maintain skills in microscopic interpretation. Optimal results are obtained if the same physician does the aspiration and interprets the slides.

When performed and interpreted by a trained physician, fine-needle aspiration of the prostate gland is a highly accurate, fast and minimally invasive biopsy technique. There is a great need in this country for training programs to instruct physicians in the techniques of fine-needle aspiration of the prostate gland and other organs. If trained physicians are unavailable, it is better to rely on traditional histologic techniques. During the transition period between the use of traditional (core) biopsy and the implementation of fine-needle aspiration techniques, it may be feasible to do both procedures until such time as enough experience with the aspiration technique has been gained.

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Hepatitis— δ -Agent

THE RECENT DISCOVERY of a new hepatitis agent called delta (δ) marks the most exciting milestone since the identification of hepatitis A and B viruses nearly two decades ago. The δ -agent is a defective RNA virus, thus a virus taxonomically distinct from the hepatitis B virus (HBV) but requiring helper functions supplied by HBV. Hence, δ -hepatitis can occur *only* in the presence of HBV, and has three clinically recognizable forms: concomitant acute B and acute δ -hepatitis,